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# RUSLE2

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# RUSLE2



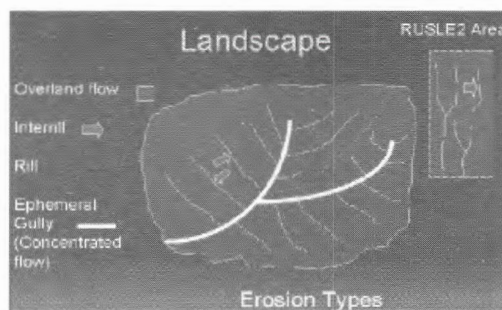
## Revised Universal Soil Loss Equation 2

### What is RUSLE2?

Released in 2003, the Revised Universal Soil Loss Equation 2 (RUSLE2) estimates soil loss from rill and interrill erosion caused by rainfall on cropland. RUSLE2, like its predecessors, RUSLE and USLE, is used to predict the long-term average rate of rill and interrill erosion for several alternative combinations of crop system and management practice. It also considers specified soil types, rainfall patterns, and topography. When these predicted losses are compared with soil loss tolerances, RUSLE2 provides specific guidelines for effective erosion control.

### What is rill and interrill erosion?

Rill and interrill erosion is the removal of layers from the land surface by the action of rainfall and runoff. Erosion begins with the impact of raindrops, detaching soil particles and moving them across the surface. This process causes interrill erosion (sometimes called sheet erosion). Runoff from interrill erosion will collect and form rills across the hill slope. Sediment from rill and interrill erosion is transported down slope to where it slows enough to be deposited on the land surface or deposited directly into concentrated flow channels.



### How does RUSLE2 work?

RUSLE2 is an advanced, user-friendly software model that predicts long-term, average-annual erosion by water. It runs in a Windows environment, and can be used for a broad range of cropland, hayland, pasture, construction, and forestry sites.

Developed jointly by the USDA-Agricultural Research Service (ARS), the USDA-Natural Resources Conservation Service (NRCS), and the University of Tennessee, RUSLE2 was written primarily to guide conservation planning, inventory erosion rates and estimate sediment delivery. RUSLE2 is an erosion prediction tool that will be used by NRCS for all conservation planning. Values computed by RUSLE2 are supported by accepted scientific knowledge and technical judgment, are consistent with sound principles of conservation planning, and result in effective conservation plans for control of erosion.

### Who will use RUSLE2?

NRCS staff and partners will be the primary users of RUSLE2. However, Technical Service Providers (TSP) may be using RUSLE2 as they assist NRCS in Nutrient Management Plans and other TSP Farm Bill Program assistance.

### RUSLE2 Predicting Rainfall Erosion Losses $A = RKLSCP$

A = average annual soil loss from rill and interrill erosion caused by rainfall and its associated overland flow expressed in tons/acre/year

R = climate erodibility

K = soil erodibility measured under a standard condition

L = slope length

S = slope steepness

C = cover management

P = support practices

# RUSLE2

## How did RUSLE2 evolve?

RUSLE2 has evolved from a series of previous erosion prediction technologies.

The *USLE* (*Universal Soil Loss Equation*), released in the early 1960s, is an index-based, empirically derived equation limited in its application to conditions where experimental data are available for deriving factor values.

A major advancement in *RUSLE*, released in the early 1990s, was the use of subfactor relationships to compute C (cover management) factor values from basic features of cover management systems. While *RUSLE* retained the basic structure of *USLE*, process-based relationships were added where empirical data and relationships were inadequate, such as computing the effect of strip cropping and for modern conservation tillage systems.

## What is new about RUSLE2?

- ✧ Most of the factors and relationships have been revised.
- ✧ New county-specific climate data is based on more current data collected at weather stations.
- ✧ The RUSLE2 model calculates soil loss for every day of the year. The final calculation (average annual soil loss) is the sum of all daily values.
- ✧ RUSLE2 includes new methods for handling residue, including resurfacing of residue by implements like field cultivators.
- ✧ RUSLE2 has a new, modern graphical user interface, making the model easy to use, but extremely powerful in the information that it displays and the types of situations that it can represent.
- ✧ Validation of RUSLE2 is proved by 10,000 plot years of data from natural runoff plots and 2,000 plot years of rainfall simulated plots.

## When will RUSLE2 be implemented?

All offices will use RUSLE2 for conservation planning beginning January 2004. Field offices were initially trained on the program in April 2003.

Refresher training is being offered on an as needed basis. This new erosion prediction tool will be used by NRCS staff for conservation planning, Farm Bill Programs, inventories, and estimating sediment production for watershed structures.

## Where can I get information on the RUSLE2 computer program?

Additional information on the RUSLE2 computer program can be downloaded from the RUSLE2 website:

[fargo.nserl.purdue.edu/rusle2\\_dataweb/RUSLE2\\_index.htm](http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_index.htm)

The website includes:

- ✧ About RUSLE2
- ✧ RUSLE2 Program File
- ✧ NRCS Base Database
- ✧ Crop Management Templates
- ✧ Soils
- ✧ User's Guide
- ✧ RUSLE2 Tutorial



Photo by Lynn Betts, USDA-NRCS

*Erosion and sediment in a field in Northeast Iowa.*

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